Numerical computation and applications of nonnegative matrix factorizations

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Abstract

The Nonnegative Matrix Factorization (NMF) has become an increasingly popular approach in many areas of science and technology. A number of properties and a nonlinear programming formulation for NMF are introduced, which allow approximations to the solution of diverse image processing problems, ranging from data analysis to video summarization, pattern recognition and image reconstruction. Among others, a spectral projected gradient algorithm is presented for the solution of the corresponding optimization problem. Techniques for finding an initial point for the above mentioned algorithm are also discussed. Some computational experience as well as application to real life problems are reported to highlight the efficiency of these techniques in practice.

Keywords

Matrix factorization, Nonlinear programming, Image processing models.